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FAILURE TO APPLY NEW TECHNOLOGY IN USSR TURBINE BUILDING

PLANT GETS LITTLE AID FROM MINISTRY -- Moscow, Izvestiya, 28 Sep 52

Throughout 1952, fine cracks have been turning up in the stainless steel turbine blades produced at the Kar'kov Turbogenerator Plant. Representations made by the plant management to the Ministry of Heavy Machine Building have brought little help from the ministry in remedying this trouble.

The assistance of the ministry also leaves much to be desired in the solution of certain problems connected with the approval of a design for a new turbine.

ROOM FOR IMPROVEMENT DESPITE 10-YEAR TRIPLING OF PRODUCTION -- Leningradskaya Pravda, 31 Oct 52

The 1951 production of turbines at the Leningrad Metal Plant imeni Stalin, measured in aggregate power, was three times as great as the 1940 figure, whereas the number of workers engaged in the manufacture of the turbines has been cut to half the 1940 number. These achievements stem directly from the broad unification, since the war, of 70 percent of the parts of all types of turbines [i.e., of the parts of turbines within each of the types].

At the Leningrad Plant imeni Lenin, housings for parts of low-power turbines are now being pressed from sheet metal, then welded by automatic machines. This process is reducing the weight of housings by 35 percent, as well as improving their quality and boosting the production rate. Cast-steel steam-turbine boxes made at the Plant imeni Lenin are of superior design, but other turbine-building plants do not make use of the experience and methods of this plant in the manufacture of these units.

The recent sharp increase in turbine production suggest the desirability of establishing centralized points for the manufacture of certain turbine parts, such as disks. The production of these parts in the forged state is

50X1-HUM

- 1 -

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CONFIDENTIAL

50X1-HUM

now seated in a great many plants, and is performed, as a rule, by free forging. Tolerances are high on this kind of forging, and great amounts of metal are wasted in subsequent machining.

On the initiative of representatives from the Leningrad Plant imeni Lenin, experimental production of disks by drop forging and subsequent rolling was established at the wheel-rolling shop of the Nizhnedneprovsk Plant imeni Karl Liebknecht. These disks were subjected to tests at the Central Scientific Research Institute of Technology and Machine Building, where it was found that, despite having been subjected to the increased temperature required for drop forging and rolling, they were in every way as good as disks made by the old methods. Furthermore, the weight of the forgings was cut in half.

Broad unification of types and sizes of disks is essential to the introduction of advanced technology in turbine building. Work conducted by the Central Scientific Research Boiler and Turbine Institute imeni Polzunov has shown such unification to be practicable.

Precision casting is not sufficiently utilized in the manufacture of turbine blades.

The institutes are an important source of aid in developing the technology of turbine building. The Central Scientific Research Institute of Technology and Machine Building conducted research which showed it to be possible to make hydroturbine blades of carbon or low-alloy steel, coated with stainless steel, as a substitute for blades made entirely of stainless steel.

Other advanced methods of turbine-blade manufacture, calling for simplification of operations in heat treatment and machining of blades, are still lagging behind in their application, and the Main Administration of the Turbine Industry, Ministry of Heavy Machine Building, is making no great effort to push them.

Organizations such as the Orgtyazhmash Institute should issue instructive material embodying experience gained from turbine manufacturing plants. -- V. Desnitskiy, Deputy Chief Metallurgist, Leningrad Plant imeni Lenin

DELAY PRODUCTION OF CAST BLADES -- Leningradskaya Pravda, 3 Feb 53

About 80 percent of the billets used in the manufacture of turbine blades are made of hot-rolled profile steel; the remaining billets are manufactured by drop forging or cold rolling.

According to figures released by the Central Scientific Research Boiler and Turbine Institute imeni Polzunov, over 75 percent of the metal from forged or profile-rolled billets goes into chips during the manufacture of the billets into turbine blades. It is obvious that strenuous efforts must be turned toward the production of billets whose dimensions approach to the maximum those of the finished product.

Low-tolerance forging methods and precision casting present the best means of attaining this goal. Precision-cast billets lose only 15 percent of their metal on being machined into blades.

The Leningrad Metal Plant imeni Stalin is already able to turn out unique, cheap blade castings, weighing up to 6 kilograms, for powerful high-pressure steam turbines. Only one ninth of the labor formerly required is needed to machine these castings, only one fourth of the usual amount of metal is wasted in the process, and production costs are one fourth those for rolled or forged blades.

- 2 -

CONFIDENTIAL

CONFIDENTIAL

50X1-HUM

Use of cast blades should make it possible to improve the design of turbines. It is now possible to produce all-cast blades. The Leningrad Plant imeni Lenin has already proved the feasibility of manufacturing cast turbine blades which do not require subsequent machining of the contour parts.

In view of the current campaign to reduce weight while improving design, considerable attention is being given to the production of hollow turbine blades. The practicability of their application has been demonstrated by representatives of the Leningrad Electrical Engineering Institute imeni Ul'yanov, working in collaboration with engineers of the Leningrad Plant imeni Lenin. Research conducted at the Metal Plant imeni Stalin, and at the Kirov Plant, both of Leningrad, in collaboration with the Polytechnical Institute imeni Kalinin, the Electrical Engineering Institute imeni Ul'yanov, the Leningrad Branch of the Orgtyazhmash Institute, and the Central Scientific Research Boiler and Turbine Institute imeni Polzunov, has shown that the mechanical properties of cast blades closely approach those of ordinary steel blades which have been subjected to pressure deformation.

Despite the proven qualities of cast blades, however, their production is being developed slowly. Thus for 2 years the Plant imeni Lenin has been turning out precision castings for turbine blades only on an experimental basis, under the direction of the plant laboratory; and it was not until 1952 that the Plant imeni Stalin established a precision casting shop, which turns out only steam-turbine stator blades. Several plants have not yet mastered production of cast blades at all. Precision drop forging of turbine blades, as established 2 years ago by the Orgtyazhmash Institute, is not being developed as it should be. Also, simultaneous rolling of blades and spacers is not being applied.

The extensive experience in turbine design and building which has been gained in certain parts of the industry is not yet sufficiently disseminated. Branches of the Central Scientific Research Institute of Heavy Machine Building, and of the Orgtyazhmash and Orgtransmash institutes, have done very little along this line, and are merely playing the role of bystander in the question.

There is considerable need for centralized production of turbine parts, especially of blades and spacers. With a view to improving the spare parts situation, it would be desirable for the manufacturer of turbine blades to be organized according to blade configuration and size rather than according to turbine type, as is now the practice.

FAIL TO UTILIZE AVAILABLE RESOURCES -- Leningradskaya Pravda, 22 Mar 53

At the Leningrad Metal Plant imeni Stalin, stator blades are made from sheet metal in an extremely primitive die. After pressing, the blades have to be hand straightened by highly skilled mechanics. A new method of pressing was worked out at the plant and approved by the Division of the Chief Metallurgist; nothing further, however, has been done to implement the method.

The plant manufactures and cuts most of its rotor blades from rolled bars, with up to 83 percent of the metal going into chips. Some of the blades are made from drop-forged parts which are up to three times as large as the finished blades.

The forging rolls at the plant, with which certain blades can be turned out with lower tolerances than when drop-forged, are used to only 15 percent of their productive capacity.

There is a precision-casting shop at the plant, but blades are not cast there because there are no provisions for checking the quality of precision-cast blades.

- 3 -

CONFIDENTIAL

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50X1-HUM

The situation at the Leningrad Plant imeni Lenin is no better. Here also there is a special section for precision casting turbine blades, but all blades are actually manufactured from rolled stock, with an accompanying loss of 78-82 percent of the metal.

The plant's forge shop has two drop hammers. These units are capable of turning out a great many drop-forged semifinished parts for turbine blades at a considerable saving in metal and machining operations; but apparently something prevents their use.

On several occasions, Stalin Prize winner A. V. Potekhin, chief of the foundry of the Leningrad Machinery Plant of the Petroleum Industry, has visited the Plant imeni Lenin and proposed application of his method of turning out blades on crank presses. The plant, however, has not exerted itself to obtain the required presses.

The Plant imeni Lenin is planning to establish precession drop forging of turbine blades, but has made little progress so far.

During recent years, the foundries and forge shops of the turbine industry have not kept pace with technological advances. The forge shop of the Metal Plant imeni Stalin, for example, has nearly doubled its output of forgings during the past 2 years, but still fails to meet the demands of its plant, which must contract [for forgings] with other enterprises at great expense.

The former Ministry of Heavy Machine Building has failed to give proper direction to the Central Scientific Research Boiler and Turbine Institute imeni Polzunov and to the Leningrad Affiliates of the Gidrot'yazhmash and Orgtyazhmash institutes, all of which work frequently at cross purposes.

BIG TASKS FACE POWER INDUSTRY -- Moscow, Pravda, 18 Apr 1953

Future USSR power requirements have set a 1955 goal for steam-turbine production which is 2.3 times the 1950 figure; the goal for hydroturbines is 7.8 times the 1950 total. Besides the large, unique turbines now being built, the power industry will turn out as many improved steam turbines of low and medium power as are needed. Increased unification of heavy power equipment, including turbines, is another important 5-year goal.

Recently, some power-equipment-producing plants have not been performing up to standard. The Leningrad Metal Plant imeni Stalin, the Khar'kov Turbo-generator Plant, and some others have failed to meet the first-quarter plan for 1953, while faulty items are turning up among the products of a number of plants, chief among which is the Leningrad Metal Plant imeni Stalin as well as the Barnaul Boiler Plant and the Podol'sk Machine Building Plant. Now that the machine building ministries have been reorganized and enlarged, ideal conditions exist for developing all branches of machine building. Whereas production of power equipment formerly was handled by several main administrations belonging to different ministries, now almost all turbine-building and boiler-building plants have been brought under the Main Administration of the Boiler and Turbine Industry. Productive capacities of the plants can now be more efficiently utilized, while standardized technology can be more easily introduced into groups of plants producing like machinery.

The new main administration for boiler and turbine building must organize the supply of all types of power equipment to electric power stations. -- N. Kazakov, First Deputy Minister of Transport and Heavy Machine Building USSR

50X1-HUM

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- 4 -

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